

Three new species of *Aotus* (Leguminosae: Mirbelieae) from south-western Australia

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Abstract

Wilkins, C.F. & Chappill, J.A. Three new species of *Aotus* (Leguminosae: Mirbelieae) from south-western Australia. *Nuytsia* 17: 459–468 (2007). The following three species of *Aotus* Sm. of the legume tribe Mirbelieae are here described as new: *A. franklandii* Chappill & C.F. Wilkins, *A. lanea* Chappill & C.F. Wilkins and *A. prosacris* Chappill & C.F. Wilkins. They are found in the south-west of Western Australia and are listed as Priority species for conservation by the Western Australian Department of Environment and Conservation. They are described prior to generic revision, to provide characters for species identification to facilitate their conservation.

Introduction

Aotus Sm. is a genus of small, pea-flowered shrubs distinguished by Smith (1805) by the absence of bracteoles on the flowering stems. There are 12 described species in Western Australia and approximately four in south-eastern Australia. A further eight species are informally recognised in Western Australia, either as phrase names or manuscript names (Western Australian Herbarium 1998–). This paper serves to formally describe three of these species, all of which are poorly known and of conservation concern.

As discussed by Wilkins and Chappill (2007, this issue), recent molecular phylogenetic research has highlighted significant problems with the current generic boundaries in the legume tribe Mirbelieae. This research placed *Aotus* within *Pultenaea* s. lat. and recommended all genera therein be treated as a single genus (Orthia et al. 2005). Research into this problem is incomplete (M. Crisp. pers. comm) and therefore it seems sensible to maintain the current generic delimitation for the present paper.

Methods

Specimens from PERTH and MEL were examined and measured and morphological information recorded. The distribution maps were produced using Online Map Creation (http://www.aquarius.geomar.de/omc_intro.html) and are based on PERTH specimen data. Localities for species with a conservation listing are withheld.

Species descriptions

Aotus franklandii Chappill & C.F. Wilkins, *sp. nov.*

A. carinatae Meisn. affinis sed foliis ad caulem appressis et oculo-citrino grandiore ad basim vexilli ornato differt.

Typus: west-north-west of Denmark, Western Australia [precise locality withheld for conservation purposes], 24 October 1991, A.R. Annels 1836 (*holo*: PERTH 04425901; *iso*: CANB).

Aotus sp. Mt Frankland (A.R. Annels 1836), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au/> [accessed June 2007].

Shrub erect, 1–1.3 × 0.3 m. *Stems* cream, not ribbed, with green tubercles, and with dense, white, appressed, straight hairs, to 1.1 mm long, glabrescent. *Stipules* absent. *Leaves* appressed, opposite and decussate, *petioles* 0.2–0.4 mm long, *blade* base tapering, discolorous, mid green over dark green, incurved, ovate or elliptic, 2.0–7.1 × 0.8–3.4 mm, adaxial surface with dense hairs, appressed, 0.2–1.0 mm long, abaxial surface glabrous or with medium density, white, appressed hairs, to 0.8 mm long, glabrescent, margin flat, apex acute, mucro persistent, cream, 0.15–0.2 mm long. *Flowers* one per leaf axil. *Bracts* persistent (trapped in erect leaf), obovate, 0.8–2.1 × 0.6–1.0 mm. *Bracteoles* absent. *Pedicels* 0.3–0.8 mm long. *Buds* calyx portion pale brown, chartaceous, ecostate, ellipsoid, 5.5–6.0 × 1.7 mm (including emergent petals), 1.3–2.3 × 1.6–1.8 mm (calyx without emergent petals), glabrous or few hairs at base of tube 0.2 mm long, apiculum absent. *Hypanthium* 0.5–0.55 mm long. *Calyx* lobes valvate, all symmetrical, acute, adaxial lobes 0.3 × 0.5–0.8 mm, fused for *c.* 1.3 mm, abaxial lobes 0.5–0.6 × 0.5–0.6 mm, fused for *c.* 0.8 mm. *Standard* claw red, 2.1–2.4 × 0.35–0.5 mm, lamina base with large, pale yellow eye with red margin, front yellow-orange with red markings towards apex of standard present or absent, same on back, scarcely ovate, to circular, 6.2–8.3 × 6.6–8.6 mm, auricles present, emarginate indentation 0.2 mm long. *Wings* claw 1.3–1.7 mm long, lamina yellow with red marking towards the base, scarcely obovate, 5.8–7.0 × 1.7–2.1 mm, basal adaxial lobe absent, apex straight. *Keel* claw 1.4–2.0 mm long, lamina deep red, 4.7–6.3 × 1.6–2.4 mm, apex slightly upturned or straight, sub-obtuse. *Stamens* with filaments attached to hypanthium, 5.0–8.0 × 0.1–0.2 mm, uniform width; anthers white, dorsifixed, *c.* 0.4 × 0.2 mm. *Ovary* with dense, spreading, straight hairs to 0.5 mm long, constricted at join with style, *stipe* 0.1 mm long, *ovary* 0.8–1.0 × 0.4 mm, *style* 4.6–6.9 × 0.05–0.1 mm, glabrous, with minute terminal stigma; *ovules* 2, funicles *c.* 0.1 mm long. *Fruit* and *seed* not seen. (Figure 1)

Selected specimens. WESTERN AUSTRALIA: [localities withheld] 30 Nov. 2000, J.A. Chappill & C.F. Wilkins JAC 6569 (PERTH 07460376); 6 Oct. 1994, T.D. Macfarlane 2268 (PERTH 04617231).

Distribution and habitat. *Aotus franklandii* is known only from the vicinity of Mt Frankland in southern Western Australia (Figure 2A). This species grows on grey peaty sand in dense, swampy shrubland surrounded by woodland.

Flowering period. October to November.

Conservation status. Listed as Priority Two under Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora by Atkins (2006), under the name *A. sp.* Mt Frankland (A.R. Annels 1836).

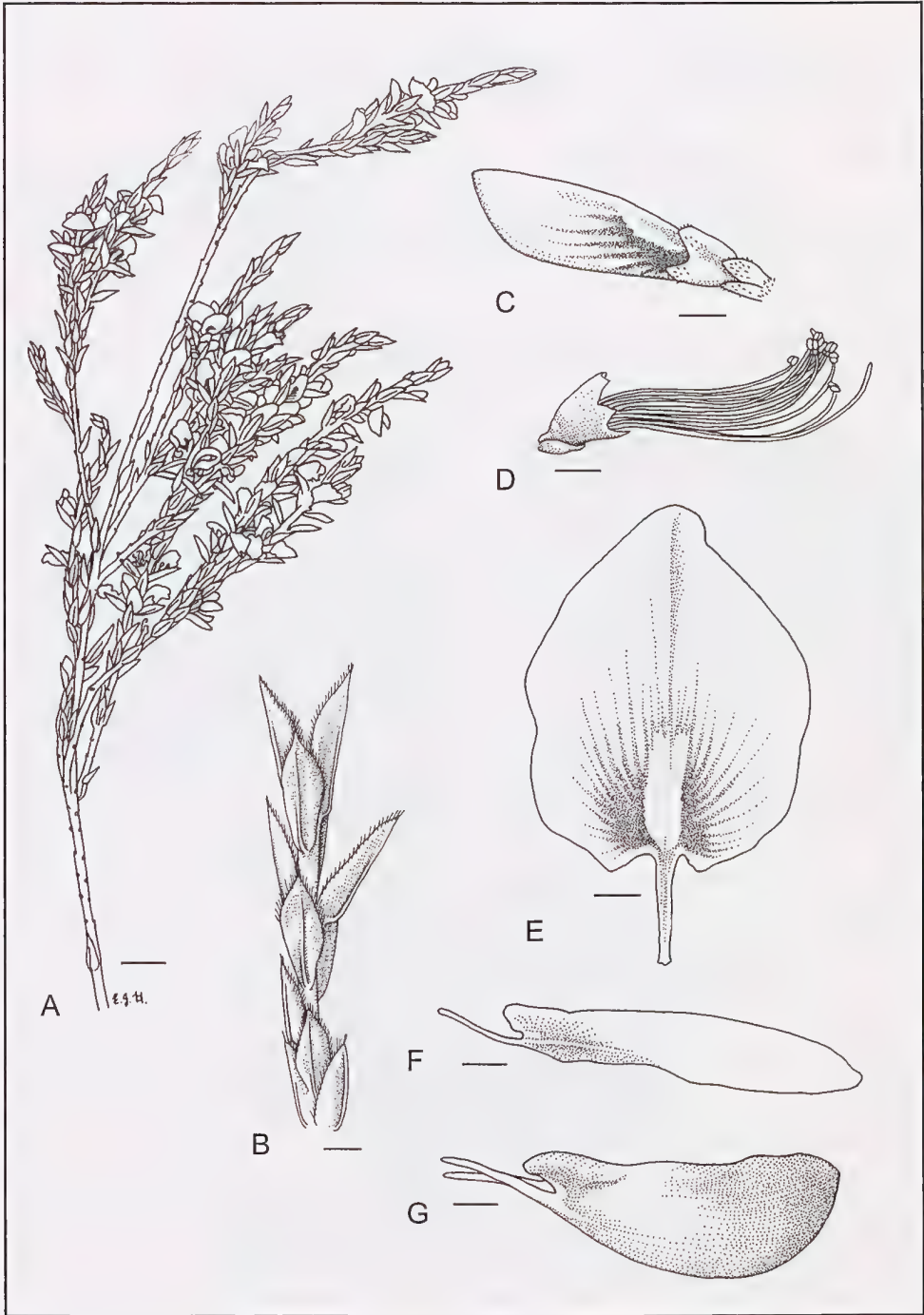


Figure 1. *Aotus franklandii*. A – erect habit; B – branch detail showing appressed, opposite and decussate leaves; C – bud showing emergent petals and small calyx; D – calyx showing anthers, filaments and style, petals removed; E – standard with large eye; F – wing; G – keel. Drawn from the holotype (A.R. Arnolds 1836). Scale bars = 10 mm (A); 2 mm (B); 1 mm (C–G).

Etymology. The species epithet refers to its restricted distribution in the Mt Frankland area.

Notes. *Aotus franklandii* differs from *A. carinata* Meisn. in having appressed leaves, and the base of the standard has a larger, lemon-coloured eye.

Aotus lanea Chappill & C.F. Wilkins, *sp. nov.*

Fruticulus nanus, prostratus; stipulae absentes; folia elliptica; bracteae absentes; bracteolae absentes; flores unus in quoque axe folii ordinati; petala aurantiaco-rubra, parva; pili lanati in superficiebus ambabus folii et calycis ornat.

Typus: east-north-east of Hyden, Western Australia [precise locality withheld for conservation purposes], 29 October 2002, *R. Davis* 10506 (*holo:* PERTH 06197655; *iso:* AD, BRI, CANB, K, MEL, NSW).

Aotus sp. furry diffusa (R.J. Cranfield 11258), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au/> [accessed June 2007].

Shrub prostrate, 4–20 × 10–130 cm. *Stems* brown, ribbed, smooth with dense, white, spreading, straight hairs to 1.3 mm long, glabrescent. *Stipules* absent. *Leaves* spreading, alternate, *petioles* 0.3–0.7 mm long, *blade* base tapering, concolourous, grey, flat, elliptic, 2.3–6.0 × 1.3–2.4 mm, both surfaces with very dense, white, spreading hairs to 0.8 mm long, remaining hairy with age, hairs slightly denser on the abaxial surface, margin flat, apex acute, mucro absent, or caducous, rarely brown, *c.* 0.1 mm long. *Flowers* one per leaf axil. *Bracts* absent, leaf only at base of pedicel. *Bracteoles* absent. *Pedicels* 2.2–5.4 mm long. *Buds* calyx portion green with red markings at base of lobes, ecostate, 4.0–4.3 × 2.4–2.5 mm, with very dense hairs, 0.1–0.9 mm long, apiculum 0.1–0.15 mm long, petals emergent. *Hypanthium* 0.4–0.8 mm long. *Calyx* lobes all symmetrical, acute, adaxial lobes valvate 1.8–2.1 × 1.3–1.5 mm, fused for 1.8–2.0 mm, abaxial lobes imbricate, 2.3–2.5 × 1.2–1.3 mm, fused for 1.3–1.8 mm. *Standard* claw cream, 2.3–2.6 × 0.6–0.65 mm, base with pale yellow eye with red margin, lamina front reddish-orange, back orange-red with yellow markings, auricles absent, elliptic, 5.5–5.9 × 7.0–8.6 mm, emarginate indentation 0.1–0.2 mm. *Wings* claw 2.2–2.3 mm long, lamina red-orange, narrowly obovate, rounded base, with or without small adaxial lobe, lamina 5.2–5.8 × 1.1–2.2 mm, apex straight. *Keel* claw 2.0–2.4 mm long, lamina deep red-orange, 5.5–5.6 × 2.4–3.6 mm, apex straight, sub obtuse. *Stamens* with filaments attached to hypanthium, 5.5–7.8 × 0.15–0.2 mm; anthers yellow, dorsifixed, *c.* 0.6 × 0.3 mm. *Ovary* with dense, spreading, straight hairs to 1.5 mm long, *stipe* 0.4–0.7 mm long, *ovary* 1.3–1.5 × 0.6–0.8 mm, constricted at join with style, *style* 5.8–6.3 × 0.08–0.15 mm, glabrous, with minute terminal stigma; *ovules* 2, funicles, 0.15–0.18 mm long. *Fruit* ellipsoid, inflated, *c.* 3.4 × 2.3 mm, externally with dense, long, spreading hairs, internally with short, appressed hairs. *Seed* reniform with prominent radicular lobe, black, surface smooth or rough, *c.* 1.7 × 1.3 mm, exarillate. (Figure 3)

Selected specimens. WESTERN AUSTRALIA: [localities withheld] 18 Dec. 1952, *W.T. Brown s.n.* (PERTH 01041622); 18 Nov. 1953, *W.T. Brown s.n.* (PERTH 01751743); 9 Apr. 1997, *R.J. Cranfield* 11258 (PERTH 04673190); 2 Nov. 1983, *K. Newbey* 9832 (PERTH 03556565).

Distribution and habitat. *Aotus lanea* occurs in the area including Lake King, Salmon Gums and Hyden in southern Western Australia (Figure 2B). This species grows in scrubland in yellow or grey clayey-sand, or well drained deep aeolian sand.

Flowering period. October to December and one collection flowering in April.

Conservation status. Listed by Atkins (2006) as Priority One under DEC Conservation Codes for Western Australian Flora, under the name *A. sp. furry diffusa* (R.J. Cranfield 11258).

Etymology. The specific epithet (*L. laneus* = woolly) refers to the very dense woolly hairs on the stem, leaves and calyx of this species when compared to its closest relative *A. diffusa*.

Notes. Apart from being of more woolly appearance, this species differs from *A. diffusa* in the bracts being absent and in having smaller flowers.

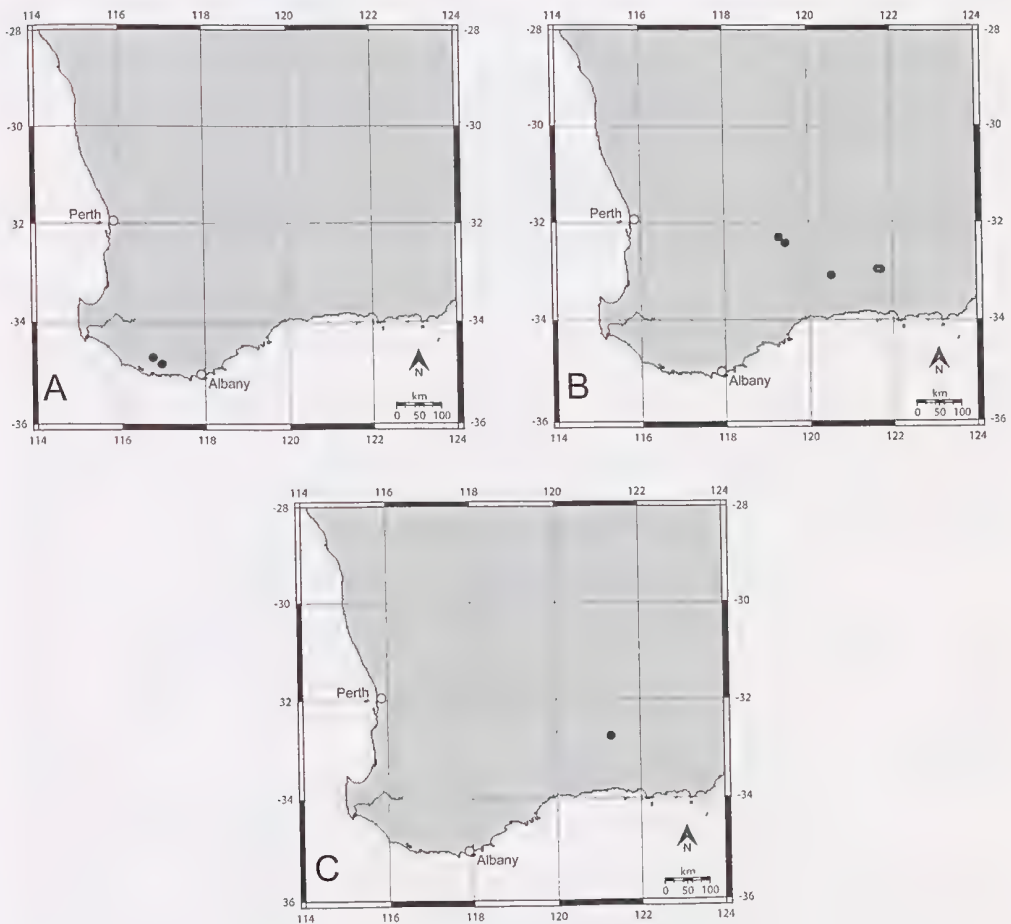


Figure 2. Distribution in south-west Western Australia of A – *Aotus franklandii*; B – *A. lanea*; C – *A. prosacris*.

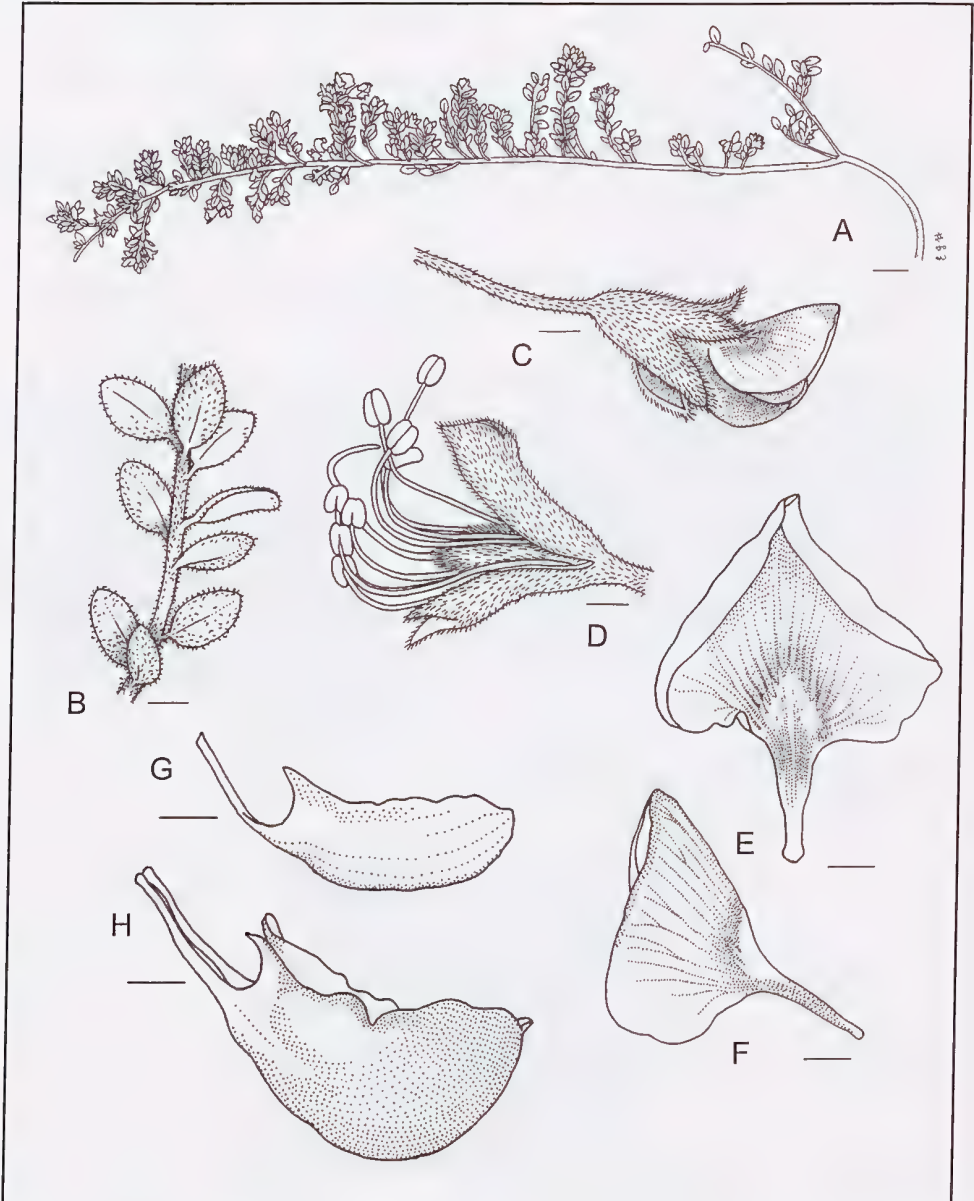


Figure 3. *Aotus lanea*. A – prostrate habit; B – branch detail showing alternate leaves, with hairs on both surfaces; C – bud showing dense hairs on outer surface of calyx and petals emergent; D – calyx showing gynoecium and androecium, petals removed; E – standard, inner surface; F – standard, outer surface shown from side; G – wing; H – keel. Drawn from the holotype (R. Davis 10506). Scale bars = 10 mm (A); 2 mm (B); 1 mm (C–H).

Aotus prosacris Chappill & C.F. Wilkins, *sp. nov.*

Fruticulus nanus, prostratus; stipulae absentes; folia oblongo-elliptica; bracteae absentes; bracteolae praesentes; flores unus in quoque axe folii ordinati; petala aurantiaco-flava, carina viridi; pagina exterior calycis viridis.

Typus: near Peak Charles, Western Australia [precise locality withheld for conservation purposes], 17 September 1999, S. Donaldson, G.T. Chandler & A. Monro SD 2232 (*holo*: PERTH 05916038; *iso*: CANB).

Aotus sp. Peak Charles (S. Donaldson 2232), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au/> [accessed June 2007].

Shrub prostrate to 1 m across. *Stem* pale red-brown, not ribbed, with green tubercles and dense, white, spreading, straight hairs 0.3–0.7 mm long. *Stipules* absent. *Leaves* spreading, alternate, rarely opposite and decussate; *petioles* 0.4–0.9 mm long; *blade* base tapering, concolorous, grey-green, flat or slightly incurved at apex, oblong-elliptic, adaxial surface with scattered, wavy, spreading, hairs 0.3–0.7 mm long, glabrescent, abaxial surface with scattered hairs to 0.7 mm long, 3.2–7.8 × 0.8–2.0 mm, margin flat, apex rounded, mucro absent. *Flowers* one per leaf axil. *Bracts* absent, leaf only at base of pedicel. *Bracteoles* caducous or persistent, chartaceous brown, ovate, 0.5–2.0 × 0.2–0.4 mm. *Pedicels* 1.6–2.5 mm long. *Bud* calyx portion green with faint red markings at base of lobes (and yellow-red petals emergent), with scattered, white hairs, 0.7 and 0.15 mm long, *c.* 6.3 × 2.5 mm (including emergent petals), *c.* 4.5 × 2.0 mm (just calyx without petals), ellipsoid, ecostate (free lobes) without prominent veins, apiculum absent. *Hypanthium* 0.7–1.0 mm long. *Calyx* lobes symmetrical, acute, adaxial lobes valvate, 1.2–1.5 × 1.2–1.3 mm, fused for 2.4–2.5 mm, abaxial lobes imbricate, 2.0–2.4 × 1.1–1.2 mm, fused for 1.5–2.0 mm. *Standard* claw cream, 2.3–2.5 × 0.5–1.3 mm, lamina base with pale yellow eye, centre with broad, dark red marking, towards lateral margins orange-yellow, same on back, elliptic, 6.6–7.8 × 7.5–8.0 mm, auricles absent, emarginate indentation *c.* 0.3 mm long. *Wings* claw 2.2–2.3 mm long, curved, lamina orange-yellow, scarcely obovate, base with adaxial lobe present, 5.6–5.8 × 2.2–2.4 mm, apex straight. *Keel* claw *c.* 2.0 mm long, lamina deep red, 5.9–6.1 × 2.3–2.5 mm, apex straight, sub-obtuse. *Stamens* with lemon filaments, 6.0–8.3 × 0.15–0.2 mm, uniform width; anthers yellow, dorsifixed, *c.* 0.4 × 0.3 mm. *Ovary* with dense, spreading, straight hairs to 1.3 mm long, stipe 1.1–1.5 mm long, ovary 1.2–1.7 × 0.5–0.6 mm, constricted at join with style, *styles* 4.6–5.8 × 0.2 mm, glabrous, with minute terminal stigma; *ovules* 2, funicles *c.* 0.05 mm long. *Fruit* and *seed* not seen. (Figure 4)

Other specimen examined. WESTERN AUSTRALIA: [locality withheld] 15 Sep. 2000, J.A. Chappill, M.D. Crisp & L. Cook JAC 6438 (PERTH 07460368).

Distribution and habitat. *Aotus prosacris* is only known from a single location between Peak Charles and Daniell in Western Australia (Figure 2C). This species grows in *Allocasuarina* heath, in white sand and has been recorded as frequent in vegetation regenerating after fire.

Flowering period. August to October.

Conservation status. Recently listed as Priority One under DEC Conservation Codes for Western Australian Flora. This species is only present in the Peak Charles area.

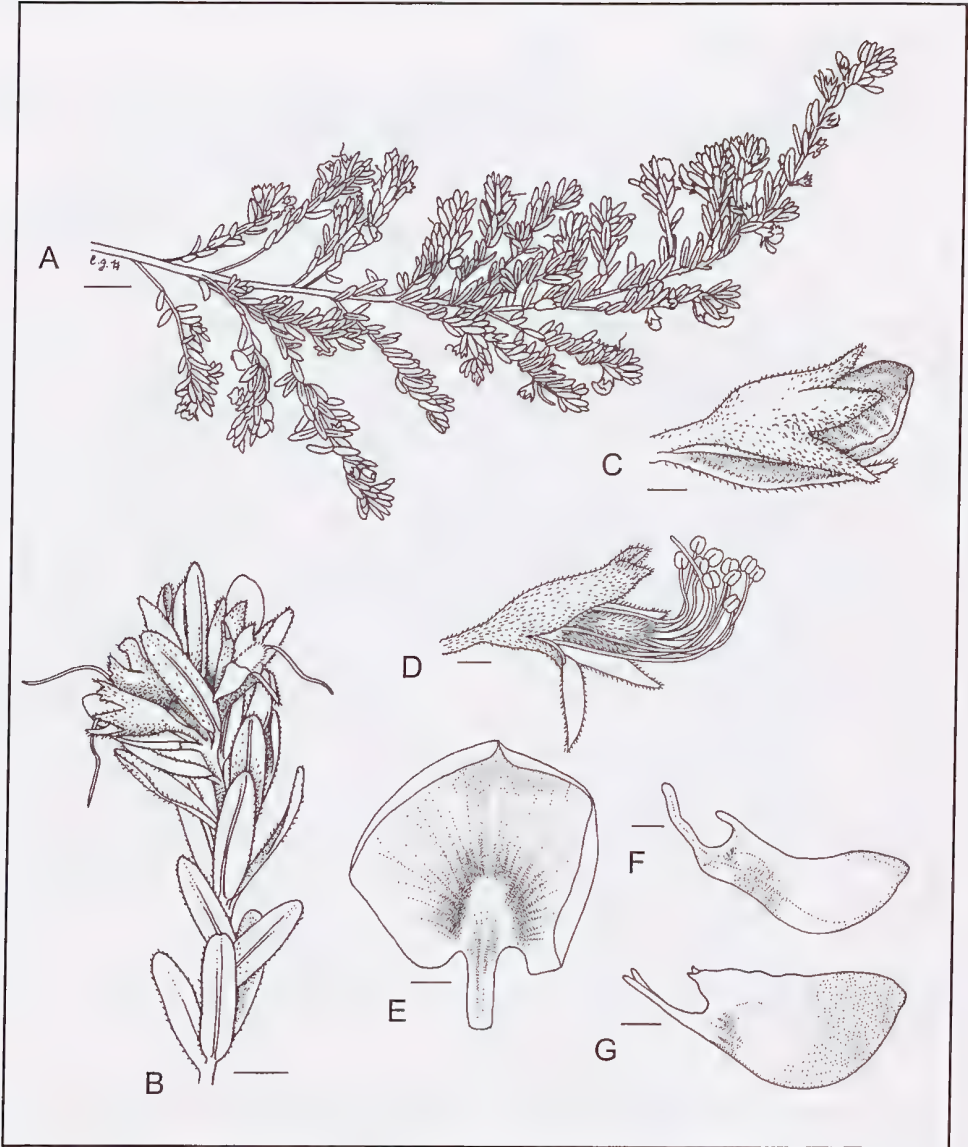


Figure 4. *Aotus prosacris*. A – prostrate habit; B – branch detail showing alternate, oblong leaves; C – bud with hairs on lower surface, calyx hairy and petals emergent; D – calyx with androecium and gynoecium visible, petals removed; E – standard; F – wing; G – keel. Drawn from the holotype (S. Donaldson, G. Chandler, A. Monro 2232). Scale bars = 10 mm (A); 3 mm (B); 1 mm (C–G).

Etymology. The specific epithet *prosacris* refers to the Peak Charles locality of this species (Gr. towards = *pros* and peak = *acris*).

Notes. *Aotus prosacris* differs from *A. diffusa* C.A. Gardner ms in having bracteoles present and bracts absent, and a green rather than red-brown outer surface of the calyx.

Whilst the presence of bracteoles contradicts the generic diagnosis of *Aotus*, Chappill considered this taxon best placed within this genus and her concept is therefore maintained. Research is ongoing (M. Crisp pers. comm.) to fully resolve the generic boundaries of *Aotus* and related genera.

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Until her death in August 2006, Jennifer Chappill was the principal investigator, collaborating with Michael Crisp, for an ongoing *Aotus* revision for "Flora of Australia."

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